

A REVISION OF THE SOUTH AFRICAN SPECIES OF ORNITHOGALUM L.

BY FRANCES M. LEIGHTON.

PART I.

The name *Ornithogalum* has its origin in antiquity. It was used by Theophrastus, the pupil of Aristotle, in his writings about 300 B.C. Pliny used the form *Ornithogalen*⁽¹⁾. Tournefort⁽²⁾ cites Dioscorides lib. 2. cap. 174 as saying, "*Ornithogalum* in the language of the Greeks ὄρνις—bird, and γάλα—milk. On the outside the flowers are certainly greenish, but when they are open, of a milk-white colour, the same colour which occurs in the wings of many birds."

Another suggestion as to the literal meaning of the name is that when the plants are in flower, the white dots scattered over the countryside resemble the droppings of birds. This view was held by some Old Testament scholars who maintain that "doves' dung" as mentioned in II Kings, chap. 6, verse 25, really refers to the bulbs of *Ornithogalum*. Credence may be given to this in view of the fact that the bulbs of *O. umbellatum* L. are still eaten in Palestine.⁽³⁾

The earliest reference to *Ornithogalum* which has been available for this work is in Clusius' *Exoticarum*, 1605. He refers here to a history of the genus which had appeared in one of his earlier books. In his *Exoticarum* he has two species of *Ornithogalum* namely, *O. neapolitanum* and *O. pyrenaicum*. Clusius mentions *O. aethiopicum* in his *Curae Posteriores* (1611) which in all probability refers to the bulbs he received from a Dutch ship that called at the Cape in 1605.⁽⁴⁾

There seems little doubt that the plant referred to on p. 138 of Parkinson's *Paradisi in Sole* (1629) as *O. aethiopicum* is the species which we now call *O. lacteum* Jacq. He says that "this plant was gathered by some Hollanders on the west side of the Cape of Good Hope".

Lists of species of *Ornithogalum* appear in Chabracius' work (1677)—12 species; in Hermann's *Hortus Lugduno-Batavi* (1687)—13 species:

(1) Chabracius: "Omnium Stirpium sciagraphia et icones" (1677).

(2) Tournefort: *Institutiones Rei Herbariae* (1700).

(3) Temple: *Flowers and Trees of Palestine* (1907).

(4) Curtis' *Botanical Magazine*, Vol. XXIX, 1164 (1809).

in Tournefort (1700)—60 species. Many of these species are no longer included in the genus. By the time the *Species Plantarum* was published Linnaeus had reduced the number of species to 12 of which to-day only 6 remain in the genus *Ornithogalum*. Linnaeus makes no reference to a plant from the Cape, but he may have included *O. thyrsoides* in his *O. arabicum*.

The bulbs of *Ornithogalum* were collected and taken to Europe by many of the early travellers. Ten Rhyne who visited the Cape in the 17th Century mentions them, apparently growing in great abundance on the flats.⁽⁵⁾ Towards the end of the following century they were introduced into the gardens of Schönbrunn by Boos & Scholl. When the plants flowered they were described, and figured by Jacquin, several of them as new species.⁽⁶⁾ Masson collected some of the bulbs which are mentioned in Aiton's *Hortus Kewensis* and the *Botanical Magazine*. Burchell was responsible for the introduction of several species and many of the collections mentioned by Baker in the *Flora Capensis* had been sent by Thomas Cooper.

DISTRIBUTION OF THE GENUS.

The following figures have been obtained from the *Index Kewensis* and must be regarded as a very rough approximation since it was not possible to verify them from the literature available.

	<i>No. of species.</i>
1. South Africa (including South-West Africa)	120
2. Tropical Africa	16
3. North Africa	9
4. Balkans, South-east Europe and the Caucasus	31
5. Asia Minor and Persia	33
6. Italy, France and Spain	25
7. Northern Europe (Sweden, Great Britain, Germany) ..	3
8. South America	4
9. Orient	2
10. Madagascar	1
11. Mexico	1

(N.B.—About 10 species are common to areas 4 and 5, and about 5 species are common to areas 4, 5 and 6.)

These figures indicate that the largest number of species is in Southern Africa, with a second centre of distribution in South-eastern Europe.

⁽⁵⁾ Ten Rhyne: *Schedisma de Promontorio Bonae Spei* (1686). Reprinted by the Van Riebeeck Society, Vol. 14, p. 106 (1933).

⁽⁶⁾ Jacquin: *Hortus Schoenbrunnensis* (1797-1804).
Jacquin: *Icones Plantarum Rariorum* (1781-93).

The genus seems to flourish in a warm temperate climate, for it is but poorly represented in the colder countries of Europe and in the Tropics.

ECONOMIC IMPORTANCE OF THE SOUTH AFRICAN SPECIES.

There has been considerable expansion in recent years of the export trade, to Great Britain and America, of inflorescences of *O. thyrsoides* and, to a lesser extent, *O. lacteum*. With the cut surface of the stalk waxed they can be carried very easily in the bud stage.

The leaves of *O. thyrsoides* have been known, when inadvertently mixed with fodder, to have caused the death of horses. It would seem that animals, grazing in pastures where the plants grow, avoid them and that a fairly large quantity of the leaves must be consumed before harmful effects are seen.⁽⁷⁾

COMMON NAMES.

A number of common names for *Ornithogalum* occur in literature. In works written in English, the most usual is Star of Bethlehem, but Bird's Milk and Milk Stars also occur. German authors use the name Vogelmilch. In South Africa the species which are grown or used for household decoration are known as Chinchinchees. In Thunberg's time, the form of this was Tintirinties, a name given because of "the sound it produced when two stalks of it were rubbed against each other."⁽⁸⁾ The original form of this was probably Tintiruintjes (uintjes = little onions.) In the Eastern part of the Cape Province the local species, both white and yellow, are often called "Cape Snowdrops". This name is sometimes given in England to those which are exported.

Owing to war conditions this work on *Ornithogalum* must be regarded as tentative. It has been impossible for the author to visit Europe to study the types which are available or to consult certain works of the relevant literature. She has, however, had opportunities of examining more living specimens than any previous worker on the systematics of this genus.

She has also had facilities for studying the herbarium material of the South African Museum, the National Herbarium, Pretoria, and the Herbarium of the National Botanic Gardens, as well as that of the Bolus Herbarium, and to the directors of these institutions her thanks are due.

TYPE OF THE GENUS.

International Bot. Congress, Cambridge, 1930. Report, p. 145.

"377. *Ornithogalum* L. Sp. Pl. 306; Gen. Pl. ed. 5., 145.

(7) Agric. Journ. C. of Good Hope, XXVIII, 165 (1906).

(8) Thunberg's Travels, Vol. I, p. 153.

O. umbellatum L., the best known of the 12 original species, half of which are now excluded from the genus. The species referred to in the citation in the Genera Plantarum (Ornithogalum Tournef. 203) is *O. arabicum* and this species is regarded as the type by Britton (Britt. and Brown, Illustr. Fl.)"

Tournefort's figure almost certainly represents *O. umbellatum* and Linnaeus' generic description seems to represent this species rather than *O. arabicum*. The observation at the end of the description on p. 145 seems to have been added to cover the inclusion of *O. arabicum* in the genus. The alternate filaments of *O. arabicum* can be described as trifid at the apex, but not those of *O. umbellatum*. Hence the author considers *O. umbellatum* and not *O. arabicum* to be the type of the genus and has given the explanation above in detail to show that there is no justification for the statement that Ornithogalum Tournef. 203 refers to *O. arabicum*.

ORNITHOGALUM.

Linn. Sp. Pl. 306 (1753); Linn. Gen. Pl. ed. 5, 145 (1754); Ait. Hort. Kew. ed. (i) vol. I, 439 (1789); ed. (ii), vol. II, 256 (1811); Willd. Sp. Pl. Vol. II. 111. (1799); Linn. Syst. Veg. ed. XV. 348 (1797); Linn. Syst. Veg. Sprengel ed. XVI, vol. II. 29. (1825); Endl. Gen. Pl. 1132 (1836-40); Kunth Enum. IV. 349 (1843); Ardernia, Aspasia, Beryllis, Brizophila, Cathissa, Eustachys, Myanthe, Osmyne, Phaeocles, Taeniola, Urophyllon, Salisb. Gen. Plant. 33-35 (1866); Harvey Gen. of S.A. Plants 397 (1868); Bak. Journ. Linn. Soc. XIII. 257 (1873); Benth. and Hook.f. Gen. Plant III. 815 (1880); Bak. in Fl. Cap. VI. 494 (1896); Bak. in Flor. Trop. Afr. VII. 544 (1898); Phillips Gen. S.A. Fl. Pl. 153 (1926); Hutch. Fam. Flow. Pl. II. 100 (1934); Krause, Engl. and Prantl Pflanz. Fam. (1930).

Bulb tunicated. *Leaves* radical. *Inflorescence* a raceme, bracts scarious, persistent. *Perianth* polyphyllous, persistent, white, yellow, orange, khaki or cinnamon-coloured, sometimes with a longitudinal median green or brownish stripe down each segment, the three segments of the inner perianth whorl usually longer and broader than those of the outer. *Stamens* 6, in two whorls, sometimes sub-equal, usually the filaments of the outer whorl narrower than those of the inner which may be widely expanded especially near the base.^(*) *Anthers* versatile, dehiscence introrse. *Ovary* sessile, trilocular, ovules many in each chamber. *Stigma* trilobed. *Capsule* with loculicidal dehiscence. *Seeds* angled or pyriform, black.

(*) Kerner describes these out-growths of the filaments as stipules.

KEY TO THE SPECIES.

- Style well developed.
 Filaments of both outer and inner whorls widely expanded.
 Style under 2 mm. long. Perianth usually orange or yellow rarely white.
 Filaments of outer and inner whorls sub-equal or with similar expansions.
 Flowers usually 3 cm. or more in diam., seeds with papillose testa 1 *miniatum*.
 Flowers usually under 3 cm. in diam., seeds with granulated testa 2 *Fergusoniae*.
 Filaments of outer whorl only slightly expanded, never with winglike out-growths 3 *flavissimum*.
 Style 2 mm. or more in length. Perianth usually white, rarely yellow.
 Flowers usually yellow, rarely white 4 *Brownleei*.
 Flowers white or cream.
 Filaments narrowly petaloid—without angular expansions 5 *subcoriaceum*.
 Filaments with angular or lobed expansions.
 Outer filaments with erect apical processes on basal expansion 6 *ceresianum*.
 Outer filaments with lateral or infolding processes on basal expansions.
 Perianth segments long, acute 7 *Hermannii*.
 Perianth segments broad, obtuse or sub-acute
 Filaments white or cream 8 *alticolum*.
 Filaments with the same colouring as the bases of the perianth segments.
 Outer filaments only slightly expanded in the lower half 9 *Leipoldtii*.
 Outer filaments with wing-like expansions in the lower half 10 *Pillansii*.
 Filaments of outer whorl simple.
 Filaments sub-equal 12 *lacteam*.
 Filaments of outer and inner whorls distinct.
 Flowers white or cream, bases of segments and ovary greenish or greyish 11 *thyrsoides*.
 Flowers pure white, ovary clear yellow or yellow green.
 Bulbs with blackish outer tunics, leaves glaucous, ovary tapering.
 Leaf margins densely ciliate 15 *fimbrimarginatum*.
 Leaf margins minutely ciliate or entire 14 *pruinsum*.
 Bulbs greyish or white, leaves green, ovary truncate 13 *conicum*.
 Style almost absent.
 Leaves linear, subterete.
 Filaments twice as long as broad.
 Inflorescence densely many flowered 16 *multifolium*.
 Inflorescence lax few flowered 17 *ranunculoides*.
 Filaments more than twice as long as broad 18 *rupestre*.
 Leave lanceolate or ovate, flat 19 *maculatum*.

The figures, which are all natural size, show in each case an analysis of the floral parts in the following order :—outer and inner perianth segments, outer and inner stamens, gynaeceum, and should be used to clarify some of the distinctions used in the key.

1. *O. miniatum* Jacq. Coll. III. 233; Ic. II. 438. *O. flavescens* Jacq. Coll. III. 233; Ic. 437. *O. aureum* Curt. Bot. Mag. 190; Kunth Enum. IV. 352 (in part); Willd. Sp. Pl. II. 124 (excl. *O. flavissimum*);

Marloth Fl. S. Af. IV. Pl. 28. p. 106. *O. thyrsoides* var. *flavescens* Lindl. Bot. Reg. 305; Kunth Enum. 353; (Bak.) Fl. Cap. VI. 499. *O. thyrsoides* var. *miniatum* Bak. ibid. 500; *O. miniatum* Kunth IV. 352. *Aspasia flavescens* Salisb. Gen. 34; *A. aureum* ibid. 34. Plants 10—35 cm. high. *Bulb* ovoid or globose 1—2 cm. diam. *Leaves* 3—5, lanceolate or lanceolate-ovate, 4—10 cm. long, 1—2 cm. broad, apices acute or obtuse, margins densely ciliate. *Inflorescence* few to many-flowered, bracts conspicuous, often as long as the pedicels; pedicels 2—5 cm. long. *Perianth* yellow, orange, orange-red, khaki-coloured or white, segments sometimes spreading widely but the flower more often cup-shaped, 3—4 cm. diam. *Perianth segments*, ovate 15—20 mm. long, 9—13 mm. broad, apices obtuse or subacute. *Stamens* less than half the length of the perianth segments, filaments all expanded into winglike out-growths in the lower half, three inner more widely expanded than the three outer, but often the two whorls, sub-equal. *Ovary* ovoid or globose, style very short, stigma large with prominent decurrent lobes. *Seeds* black with blunt papillae often short and almost knoblike.

Widely distributed in the drier areas of the South-Western Cape and extends along the edge of the Karoo as far as Uniondale, and in the coastal area to Humansdorp. Flowering Sept.-Dec.

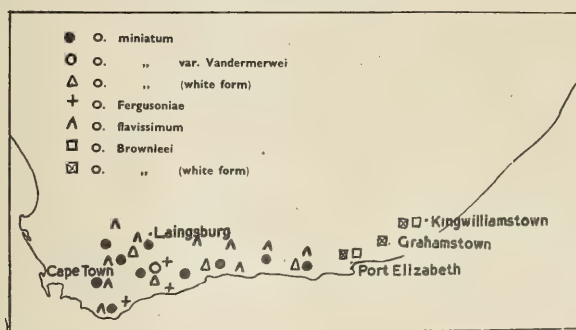
Hab. Cape Province: Caledon Div.: e hort *Stanford* in Bolus Herb. 22833; Caledon, *van der Merwe* in Nat. Herb. s.n.; Villiersdorp, *Schlechter* 9369; Genadendal *Prior* s.n.; *Schlechter* 9797; *Rogers* 29014. Bredasdorp Div.: Zoetendals Vlei, *Esterhuysen* 5223. Ceres Div.: Karooport, *Marloth* 6589, 6590. Tulbagh Div.: Tulbagh, *Stell. Univ. Gdns.* s.n.; *Marloth* 9572. Worcester Div.: Rabiesberg, *Esterhuysen* in Bolus Herb. 22834; Touws River, *Hurling and Neil* in Bolus Herb. 22839; Worcester, *du Plessis* in Bolus Herb. 22840; Hex River Valley, *Marloth* 1979; Touws River, *Lewis and Dymond* in Nat. Bot. Gdns. 1953/33. Laingsburg Div.: Tweedside, *Lewis* in Nat. Bot. Gdns. 2696/32; Lammerfontein, *Wilmot* 2 (Nat. Herb.). Robertson Div.: *Hurling and Neil* in Bolus Herb. 22841; Between McGregor and Storms Vlei, *Esterhuysen* 5222; Robertson Karoo, *Esterhuysen* in Bolus Herb. 22154. Swellendam Div.: Swellendam, *Leighton* in Bolus Herb. 22835; *Hurling and Neil* in Bolus Herb. 22836; Swellendam, *Galpin* 4768; *Hurling and Neil* in Nat. Bot. Gdns. 1956/30; Barrydale, *Galpin* 4769; Buffelsjagts Rivier, *Zeyher* 4201; Zondereinde Riv., *Zeyher* 4201B; Tradouw Pass, *Walgate* in Bolus Herb. 22850. Montagu Div.: 25 miles E. of Montagu, *Martley* in Bolus Herb. 22838. Riversdale Div.: near Vet River, *Muir* 2808. Riversdale, *Ferguson* in Bolus Herb. 19983. Knysna Div.: Knysna, *Browne* in Nat. Bot. Gdns. 123/37; Woodbourne, *Laughton* in Bolus Herb. 22832. *Duthie* 1148; Forest Hall,

Gillett 2232. Zuurberg, Koratora Keet 1003. Noetzie, Compton 24/34; Forest Hall, Fourcade 4175; Knysna, Davis in Nat. Bot. Gdns. 1537/31; Knysna Heads, Fourcade 1080. George Div.: George, Fuller in Bolus Herb. 22849 and 22702; Marloth 8329; Kaaibans Gat, Wilman in Bolus Herb. 22683. Hoogekraal Riv., Fourcade 1522; Zwart River Fourcade 1575. Prince Albert Div.: Meirings Poort, Thorns in Herb. Nat. Bot. Gns. s.n.; Uniondale Div.: Prince Alfred's Pass, Fourcade 5866; Hot Springs, Fourcade 5425; Laudina, Esterhuysen 6521. Humansdorp Div.: Hills near Humansdorp, Fourcade 1763; Bok Kraal, Fourcade 5159A.

[Fig. 1. Map I.]

Var. **Vandermerwei** (Barnes) Leighton var. nov.

O. Vandermerwei Barnes, S.A. Gardening Vol. XXI, p. 14 (Jan. 1931).



MAP I.

Perianth khaki-coloured with darker centres. *Stamens* shorter and more widely expanded than in the typical.

Hab. Swellendam Div.: near Bonnievale, Van der Merwe in Nat. Bot. Gdns. 1814/29, Hurling and Neil in Bolus Herb. 22837, Marloth 6293, Leighton in Bolus Herb. 21185; Between Swellendam and Bredasdorp, Muir 4989; Swellendam, Marloth 8633. Montagu Div.: Ashton, Hill in Nat. Bot. Gdns. 1768/29. Robertson Div.: Between McGregor and Storms Vlei, Esterhuysen 2941; Between Worcester and Robertson, Hurling and Neil in Bolus Herb. 19296; Robertson, Marloth 7746.

[Fig. 1A. Map I.]

2. *O. Fergusoniae* L. Bolus, S.A. Gardening Vol. XXII, 57 (Feb. 1932).

Plants 15–30 cm. high. *Bulb* 2–3 cm. diam. *Leaves* 3–6, linear or lanceolate, 7–13 cm. long, 10–15 mm. wide, margins ciliate. *Inflorescence* few to many-flowered, pedicels ascending or erect. *Perianth*

yellow above, green on the underside, sometimes white, segments obtuse or sub-acute, 10—15 mm. long, 6—7 mm. broad. *Stamens* short, filaments all expanded, three inner filaments unusually broad relatively to their length. *Ovary* ovoid, style short, stigma large with decurrent papillose lobes. *Seeds* pyriform, surface granulated. Flowering Oct.—Dec.

Hab. Riversdale Div.: near Still Bay, *Ferguson* in Nat. Bot. Gdns. 45/31; Hills near Kaffir Kuils River, *Muir* 2755; near Riversdale, *Muir* 2988 and 1164; *Muir* in Herb. Galpin 5400 (white form); *Muir* 3786 (white form). Swellendam Div.: near Bonnievale, *Hurling* and *Neil* in Bolus Herb. 19338, 22854. Bredasdorp Div.: Bredasdorp, *Breach* in Bolus Herb. 22855.

[Fig. 2. Map I.]

This may prove to be only a variety of *O. miniatum* Jacq., but has been kept apart by virtue of its smaller flowers, the broadness of the inner stamens and the distinct granulation of the testa.

3. *O. flavissimum* Jacq. Ic. II 436. Coll. Suppl. V, 75. *O. aureum* Red. Lil. 439 (excl. A, B, C, in citation); Kunth Enum. IV, 352 (in part) non Curtis.

Plants 10—40 cm. usually 20—30 cm. high. *Bulb* globose or depressoglobose, 1—2 cm. diam., often with a dark brown leathery tunic. *Leaves* 3—6, varying from lanceolate forms 20 cm. long, 2 cm. broad to long-ovate forms 5 cm. long, 15 mm. broad, margins densely ciliate, apices acute to obtuse. *Inflorescence* few- to many-flowered, often rather lax, rarely dense, bracts usually a little shorter than the pedicels. *Perianth* yellow or orange, segments spreading, flowers rarely cup-shaped 2—4 cm. diam., segments ovate, acute or sub-acute, 1—2 cm. long, 5—10 mm. broad. *Stamens* less than half the length of the perianth, both outer and inner filaments expanded in the lower half, outer stamens much less than the inner and the expansions not in the form of wing-like outgrowths such as those of the inner stamens. *Ovary* ovoid or somewhat globose, style short, stigma large with prominent decurrent lobes. *Seeds* echinate or sometimes with blunt papillae.

Flowering Sept.—Nov.

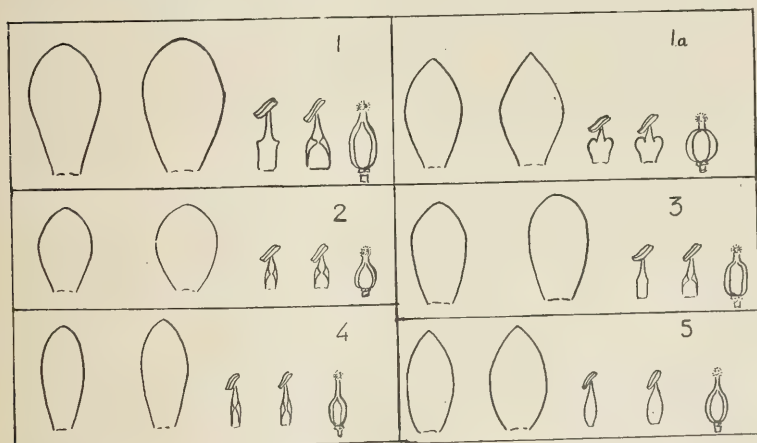
Distribution very similar to that of *O. miniatum* Jacq.

Hab. Cape Province. Bredasdorp Div.: Kathoek, *Pillans* 9370. Worcester Div.: Hex River Valley near De Doorns, *Bolus* 22830; Bottom of Hex River Pass, *Lavis* in Bolus Herb. 22831; Hex River, *Marloth* 6290; Bonteberg, *Esterhuysen* 3871, *Compton* 9967. Tulbagh Div.: Tulbagh, *Guthrie* 2768; Artois, *Compton* 11680, *Esterhuysen* 6079; Tulbagh, *Peers* in Bolus Herb. 22852, *MacOwan*, Herb. Norm. 505. Ceres Div.: Hottentots Kloof, *Compton* 12058. Laingsburg Div.: Tweedside, *Lewis* in Bolus Herb. 22829; *Barker* in Bolus Herb. 20638;

Constable, *Compton* 9738; Pieter Meintjies, *Marloth* 10781; Bantams Karoo, *Compton* 12151. Ladismith Div.: *Gillett* 1914. Oudtshoorn Div.: Road to Cango Caves, *Barker* 87; Cango Valley, *Marloth* 12126. Uniondale Div.: Haarlem, *Esterhuysen* 6932; Lauterwater, *Compton* 5251. Humansdorp Div.: Klipvei, *Esterhuysen* in Bolus Herb. 22797; Assegai Bosch, *Esterhuysen* 7121.

[Fig. 3. Map I.]

O. flavissimum and *O. miniatum* have both been upheld although the author has grave doubts as to whether they are really distinct species. The extreme forms of these species are quite distinct and it seemed wiser to keep them apart until further investigation, perhaps cytological studies, may clarify the position of the many intermediate forms. The



1. *O. miniatum*. 1a. *O. miniatum* var. *Vandermerwei*. 2. *O. Fergusoniae*.
3. *O. flavissimum*. 4. *O. Brownleei*. 5. *O. subcoriaceum*.

author has omitted from the citation several figures and references which do not show clearly, or are vague, in their description of the filaments, since this seems to be the only character on which the separation can be made.

4. ***O. Brownleei*** Leighton. S.A. Gardening Vol. XXIII, 62. (March 1933).

• Plant 20—40 cm. high. *Bulb* globose 1—2 cm. diam. *Leaves* 4—6, lanceolate to ovate with obtuse apex, 7—14 cm. long, 1—4 cm. broad, margins ciliate. *Inflorescence* lax, 7—20-flowered, bracts usually shorter than or sometimes as long as the pedicels: pedicels up to 35 mm. long. *Perianth* yellow or white, segments spreading widely, usually sweetly

scented ; segments obtuse rarely sub-acute, 12—17 mm. long, 7—10 mm. broad. *Stamens* less than half as long as the perianth segments, filaments all expanded into winglike outgrowths, three inner more widely than the three outer. *Ovary* ovoid 5—6 mm. high, style distinct 2—3 mm. long, stigma lobes decurrent, papillose.

Flowering Oct.—Nov.

Hab. King Wms. Town Div. : Middle Drift, *Brownlee* in Bolus Herb. 20366, *Crampton* 101 ; *Brownlee* in Bolus Herb. 22714 (white form). Peddie Div. : *Village Management Board* in Bolus Herb. 22842. Albany Div. : Carlisle Bridge, *Daly* 125 and 126 (white form) ; Grahamstown, *Galpin* 311. Uitenhage Div. : van Staden's Pass, *James* in Bolus Herb. 22844 ; Zuurberg—Uitenhage Road *G. G. Smith* 2869 ; Uitenhage, *E. & Z.* (S.A. Mus. 23330), *Jordan* 81 (Alb. Mus. Herb.).

[Fig. 4. Map I.]

5. *O. subcoriaceum* L. Bolus S.A. Gardening XXIV. 50. (Feb. 1934). Plants up to 20 cm. high, usually less. *Bulb* globose, 10—15 mm. diam. with tough, leathery outer tunics. *Leaves* 2—4, synanthous, erect or spreading, tough, ovato-lanceolate to ovate, rarely lanceolate, 3—8 cm. long 1—3 cm. broad, apices obtuse or sub-acute, margins conspicuous, densely ciliate. *Inflorescence* usually just overtopping the leaves, but often taller in cultivation, few or many flowered, corymbose, bracts ovate, apex attenuate, margins minutely ciliate, near the apex at least. *Perianth* white, segments ovate with a faint green median stripe on the under side which disappears as the flower ages, 12—15 mm. long, 7—10 mm. broad. *Stamens* about half as long as the perianth, filaments all expanded gradually from apex to base, 3 inner slightly broader than the three outer. *Ovary* obovate, style 2—3 mm. long, stigma with conspicuous decurrent lobes. *Seeds* tuberculate.

Flowering Sept.—Oct.

Hab. Cape Province. Calvinia Div. : near Nieuwoudtville, *L. Bolus* in Bolus Herb. 20090. Clanwilliam Div. : Pakhuis, *Salter* 2779 ; *Esterhuysen* 4390 ; Brandewyns Rivier, *Lewis* in Bolus Herb. 22853 ; Elands-kloof, *Lewis* in Bolus Herb. 22088. Cederberg, *Lamb* in Nat. Bot. Gdns. 1619/30 ; Middelberg, Cederberg, *Esterhuysen* 7278 ; Cederberg, *Thode* A2096.

[Fig. 5. Map IV.]

6. *O. ceresianum* Leighton Journ. Bot. LXXI. 72. (1933).

Plants 20—30 cm. or more high. *Bulb* globose, 16—20 mm. diam. *Leaves* 4—6, often persisting at the flowering time, linear, coriaceous, subconvolute, 10—25 cm. long, 15—30 mm. broad, apices attenuate. *Inflorescence* many-flowered, subpyramidal ; bracts shorter than the pedicels, long-cuspidate from a broad base ; pedicels spreading, up to 4

cm. long. *Perianth* cream with the lower third of each segment greenish black, segments obovate or oblong, acuminate, up to 2 cm. long and 10—11 mm. broad. *Stamens* less than half as long as the perianth segments, filaments all markedly expanded, both outer and inner whorls having winglike upgrowths at the apices of the expansions, the outer somewhat narrower than the inner. *Ovary* ovoid or slightly orbicular, truncate at the apex, dark green in colour, glabrous, style 2 mm. long, stigma lobes decurrent.

Flowering Oct.—Nov.

Hab. Cape Province. Ceres Div.: near Ceres, Cook in Nat. Bot. Gdns. 1756/25; Warm Bokkeveld, Basson in Bolus Herb. 22845; Laken Vlei, Compton 12082; Ceres, Goatcher in Bolus Herb. 13726, Heatlie in Nat. Bot. Gdns. 3710/15, Rogers 28224, Marloth 7239, MacOwan 2990 (S.A. Mus. 23332).

[Fig. 6. Map II.]

7. *O. Hermannii* Leighton S.A. Gardening Vol. XXIII. 62. (1933).

Plants 20—50 cm. high. *Bulb* globose 16—20 cm. diam. *Leaves* 5—8, often persisting at the flowering period, linear, 10—25 cm. long, 15—30 mm. broad, apices acute, margins ciliate. *Inflorescence* many-flowered, subpyramidal, rather lax, bracts acuminate, shorter than the pedicels, pedicels up to 5 cm. long. *Perianth* cream, segments acute, rarely spreading, 2—3 cm. long, 8—12 mm. broad. *Stamens* erect, less than half the length of the perianth segments, 3 outer filaments slightly expanded in the lower half, 3 inner widely expanded and lobed at the apex. *Ovary* obovoid, style slender, 3—4 mm. long, stigma small.

Flowering Sept.—Oct.

Hab. Cape Province. Clanwilliam Div.: Citrusdal, Salter 2806, 3870, in Nat. Bot. Gdns. 1038/33, Mathews in Nat. Bot. Gdns. 2100/29, Pillans 9851, 9850.

[Fig. 7. Map II.]

8. *O. alticolum* Leighton sp. nov.

Plantae alt. ad 60 cm. *Folia* lanceolata, long. ad 15 cm., lat. ad 2 cm. *marginibus* ciliatis. *Inflorescentia* alta, corymbosa, bracteis conspicuis. *Perianthium* album, segmentis obtusis vel subacutis, basibus viridibus vel brunneis, long. 12—20 mm., lat. 8—12 mm. *Stamina* omnia basi late expansa, subaequalia. *Ovarium* globosum. *Stylus* brevis, stigma lobis decurrentibus.

Hab. Cape Province. Paarl Div.: Du Toit's Kloof. Pillans 8384. (*Type*). Ceres Div.: Witsenberg. Pillans 9566. Caledon Div.: Genadendal, L. Bolus in Nat. Bot. Gdns. 410/33. Worcester Div.: Worcester, T. Cooper 1690.

Plants up to 60 cm. high. *Leaves* lanceolate, up to 15 cm. long, 2 cm.

broad, margins ciliate. *Inflorescence* tall, with a relatively short dense, corymbose head, bracts conspicuous. *Perianth* white, segments with a greenish or brown base, obtuse, rarely subacute, 12—20 mm. long, 8—12 mm. broad. *Filaments* all expanded in the lower half, with wing-like outgrowths. *Ovary* globose, style short, stigma large.

Flowering Sept.—Nov.

[Fig. 8. Map II.].

Forma β . *Inflorescence* rather long, leaves broad, arranged in a rosette on the ground.

Hab. Caledon Div.: above Houw Hoek, *M. C. Gillett* 4289.

[Fig. 8A. Map II.].

Forma γ . *Inflorescence* dense, composed of smaller flowers, filaments of the outer whorl of stamens only slightly expanded.

Hab. Caledon Div.: Hermanus, *Pells* in Bolus Herb. 22706; *Marloth* s. n. in Nat. Herb.

[Fig. 8B. Map II.].

O. alticolum differs from the white forms of *O. miniatum* chiefly in the length of the style. The plants are usually very much taller than those of *O. miniatum*.

9. *O. Leipoldtii* L. Bolus Journ. Bot. LXXI. 71 (1933). *O. revolutum* Jacq. Gawl. in Bot. Mag. 653. Plants up to 56 cm. high. *Bulb* globose or ovoid, 15—25 mm. diam. with hard, brownish outer tunics. *Leaves* 4—6, erect, clasping the base, 10—25 cm. long, 15—40 mm. broad, margins hyaline, with minute ciliations in forma γ , apices acute or sub-obtuse. *Peduncle* slender. *Inflorescence* few- to many-flowered, dense, bracts membranous, acuminate from a broad base, equal to or exceeding the pedicels. *Pedicels* ascending 15—22 mm. long. *Perianth* white, cup-like, segments, usually with a yellowish or golden brown base which fades to pure white as the flower ages, rotundate, 15—20 mm. long, 10—15 mm. broad. *Stamens* about half as long as the perianth segments, filaments grey-green, white at the apices and bases, 3 outer slightly expanded, 3 inner widely expanded with the wing-like apical outgrowths incurved. *Ovary* globose or somewhat ovoid, style 4 mm. long, stigma papillose, lobes decurrent. *Seeds* black, echinate.

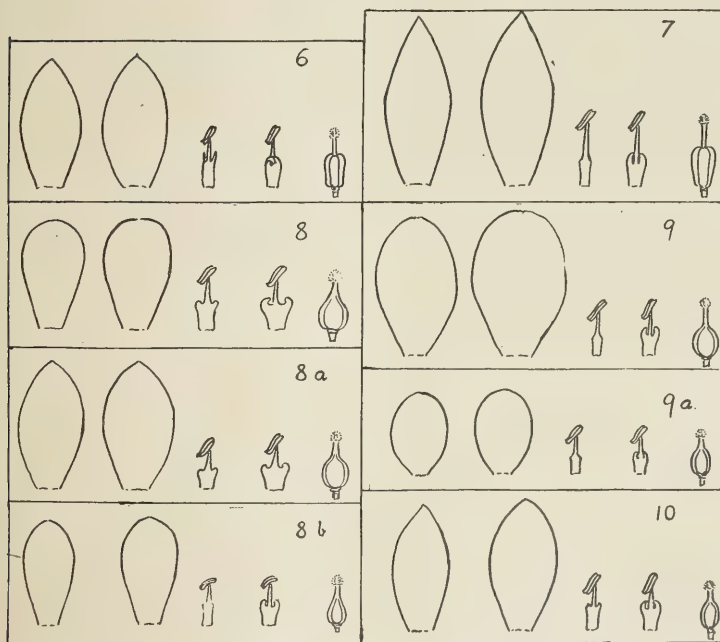
Flowering Oct.—Nov.

Hab. Cape Province. Clanwilliam Div.: Olifants River Valley near the weir, *Leipoldt* in Bolus Herb. 19941, *Mathews* in Nat. Bot. Gdns. 1892/31; Warmbaths, *L. Bolus* in Bolus Herb. 20349; Pakhuis, *Leighton* in Nat. Bot. Gdns. 1503/33; Nieuwoudt Pass, *Esterhuysen* 7162, *Compton* in Nat. Bot. Gdns. 3171/34, *Esterhuysen* in Nat. Bot. Gdns. 7/42; Middelberg, *Cederberg*, *Esterhuysen* 7132; between junction of Groot Rivier road and Elands Kloof, *Leipoldt* in Bolus Herb. 22075;

eastern ascent of Grey's Pass, *Pillans* 8665 ; nek on S. side, Grasruggens Mt., *Pillans* 8666 ; between Paleisheuvel and Sandberg, *Esterhuysen* in Nat. Bot. Gdns. 2372/34. Piquetberg Div. : E. base of the Piquetberg, *Pillans* 7986 ; Porterville, *Martley* in Bolus Herb. 22812.

Forma β differing from the type in having shorter leaves, corymbose inflorescences, and smaller flowers.

Hab. Piquetberg Div. : near Piquetberg, *Bolus* 13656, *Salter* 2718.



6. *O. ceresianum*. 7. *O. Hermannii*. 8. *O. alticolum*. 8a. *O. alticolum* forma β . 8b. *O. alticolum* forma γ . 9. *O. Leipoldtii*. 9a. *O. Leipoldtii* forma β . 10. *O. Pillansii*.

Malmesbury Div. : Koppies between Malmesbury and Hopefield, *Mathews* in Bolus Herb. 22704. Paarl Div. : outskirts of Wellington, *Leighton* in Bolus Herb. 22703.

[Fig. 9A. Map II.].

Forma γ differing from forma β only in having taller inflorescences and minute ciliations on the leaf margins.

Hab. Ceres Div. : Mitchell's Pass, *Cook* in Nat. Bot. Gdns. 1766/25 ;

Ceres, *Goatcher* in Bolus Herb. 22157, *Dymond* in Nat. Bot. Gdns. 1942/33, *Davis* in Nat. Bot. Gdns. 2531/31, *Marloth* 6390.

[Map II.].

The plant figured in Loddiges' Botanical Cabinet 1159 as *O. lacteum* belongs to this group but the staminal structure is not sufficiently clearly shown to warrant its inclusion in any of the species described here. The illustration in the Botanical Register 315 of *O. revolutum* is possibly *O. Pillansii*.

It is possible that *O. Leipoldtii* is the same as *O. revolutum* Jacq. Hort. Schoen. I 89, but, if this is the case, Jacquin's figure is poor and his description unsatisfactory. From his figure it is obvious that the plant had almost finished flowering and had been in water for some time. As this has not been matched with a specimen it has been rejected.

In Saunder's Refugium Botanicum I t. 20 the plant depicted as *O. thyrsoides* is one which appears to be closely related to *O. Leipoldtii* and *O. Pillansii* but differs from the former in respect of the character and density of the inflorescence, and from the latter in the width of the outer stamens.

10. *O. Pillansii* Leighton sp. nov.

Plantae alt. ad 50 cm. *Bulbus* oblongo-globosus, diam. 15—20 mm., tunicis duris brunneis. *Folia* 4—6, lanceolata, apicibus obtusiusculis, marginibus ciliatis. *Inflorescentia* gracilis, pedicellis patentibus. *Perianthium* niveum, segmentis latis, apicibus obtusis, vel subacutis; basibus aureo-brunneis vel viride-brunneis. *Filamenta* aureo-brunnea, basibus et apicibus albis, tria exteriora basi leviter ampliata, tria interiora basi per 3 mm. ampliata, apicibus alatis. *Ovarium* ovoideum, velutinum; stylus brevis; stigma lobis decurrentibus. *Semina* atra, spinis brevibus.

Hab. Cape Province. Piquetberg Div.: near Het Kruis, *Leighton* 134 (*Type*), *Barker* 2581; Boesmans Kloof Rivier, *Leighton* 136; Rooikransberg, *Pillans* 8087; Karroid hill S. end of Kapiteins Kloof, *Pillans* 8115, Malmesbury Div.: Riebeck Kasteel, *Salter* 1791. Clanwilliam Div.: Elandsfontein, *Pillans* 9848, 9186.

Plants 25—50 cm. high. *Bulb* oblong-globose, 15—20 cm. diam., with hard brownish outer tunics. *Leaves* 4—6, lanceolate 5—15 cm. long, 10—15 mm. broad, with densely ciliate margins, apices somewhat obtuse. *Peduncle* slender, few- to many-flowered, pedicels spreading, 20—45 mm. long at flowering time elongating as the fruit ripens. *Perianth* white, segments with a deep golden brown or greenish brown base the colour of which persists with age, broad, obtuse, sometimes sub-acute, 12—20 mm. long, 9—15 mm. broad. *Stamens* rather less than half as long as the perianth, segments filaments all expanded, golden-brown, white at the base and apex, the outer filaments with narrow wing-like

expansions, the inner with wide incurving expansions in the lower half. *Ovary* ovoid, velvety, blue-grey, style short, stigma with well-marked decurrent lobes. *Seeds* rugose with blunt papillae on the angles.

Flowering Oct.

O. Pillansii differs from *O. Leipoldtii* in the following respects:—

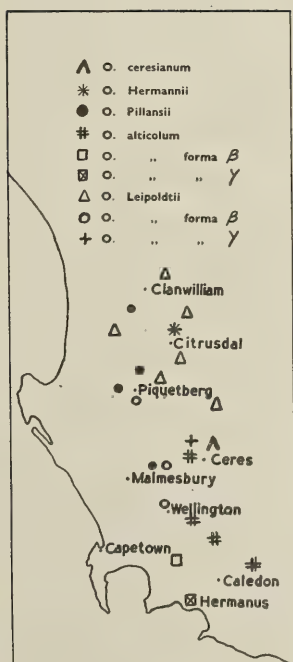
1. The outer stamens are more widely expanded.
2. The dark colouration in the centre of the flower does not fade.
3. The seeds are rugose with papillae on the angles whereas those of *O. Leipoldtii* are echinate.

[Fig. 10. Map II.]

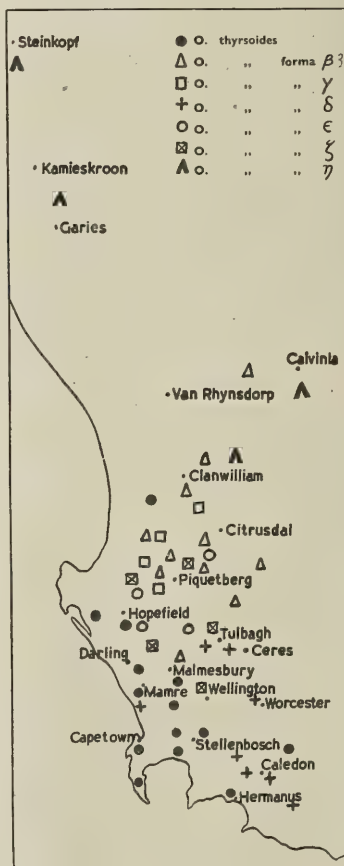
11. *O. thyrsoides* Jacq. Hort. Vind. III 17 t. 28; Thunb. Prodr. 62; Thunb. Fl. Cap. edit. Schultes 315; Ait. Hort. Kew. edit. 1. Vol. I, 442; ibid edit. 2. Vol. II, 261; Kunth Enum. IV, 353; Bot. Mag. 1164; Annales Sc. Nat. Paris XXIII, 23—24 t. 1; Edmonds and Marloth, El. Bot. S.A. 178; Henslow. S.A. Fl. Pl. 267; Agric. Journ. C. of Good Hope XXVIII 165; Willd. Sp. Pl. II 124, excl. vars.; Bak. Fl. Cap. VI 499 (synonymy in part and excl. vars.) *O. coarctatum* Jacq. Ic. II. 435. *O. bicolor* Haw. Misc. 175: *Aspasia thyrsoides* Salisb. Gen. 34.

Plants up to 60 cm. usually 20—40 cm. high. *Bulb* globose or depressoglobose, 15—25 mm. in diam., covered with whitish or grey papery tunics. *Leaves* 3—6, linear or lanceolate, 10—40 cm. long, 1—3 cm. broad, apices acute, margins hyaline, usually ciliate, rarely entire, withering or completely withered at the flowering period, rarely synanthous. *Inflorescence* usually corymbose or subcorymbose rarely long and spicate, few- or many-flowered, flowering part 5—20 cm., usually less than 10 cm. in length. *Bracts* ovate or acuminate from a broad base. *Pedicels* 2—4 cm. long when the earlier flowers open, the lower pedicels increasing to twice their original length as the flowers fade and the fruits develop, giving a corymbose appearance to the inflorescence. *Perianth* usually spreading, segments never quite flat or reflexed except under unnatural conditions (e.g. inflorescences kept long in water); cream or white, usually brownish or greyish-green near the bases of the segments, which often fades to pure white or cream as the flower ages, open flowers 25—50 mm. in diam. *Perianth-segments* long-ovate about twice as long as broad, three inner usually somewhat longer and broader than the three outer apices acute or sub-acute. *Stamens* about half as long as the perianth-segments, sometimes less, three outer simple, subulate, only slightly broader at the base than at the apex, three inner broadly and abruptly expanded in the lower half: these expansions have wing-like outgrowths at their apices which curve inwards towards the ovary. *Ovary* ovoid, brown or greenish-grey, style distinct, about half as long as the ovary, usually whitish in the upper

half: stigma with three decurrent papillose lobes: ovary, style and stigma together equal to, or a little shorter than, the stamens. *Capsules* 8—20 mm. long when ripe, containing many black, angled seeds with verrucose or rugose surfaces and dentate, or rarely, smooth margins.



MAP II.



MAP III.

Grows freely on hills, lower slopes of the mountains and on the flats, less common on the upper slopes of the mountains. Flowering Oct.—Nov. on lower slopes and flats, Dec.—Feb. on higher slopes and in ravines.

Hab. Cape Province. Cape Peninsula: Above Kirstenbosch, *Bolus* 4919; Between Fountain and Grotto Ravines, *Pillans* 4905; Skelet on

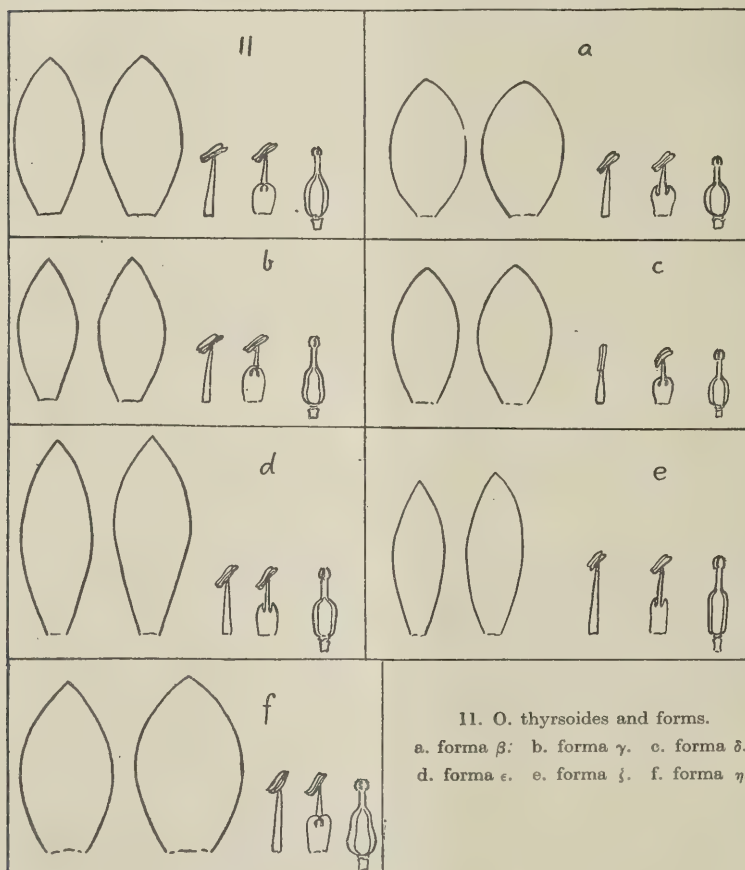
Ravine, *Wolley Dod* 977; Kirstenbosch, *Esterhuysen* 684, *Barker* 2606, *Leighton* in *Bolus* Herb. 22686; Van Kamps Bay, *MacOwan* Herb. Norm. 940, *Zeyher* 733, (S.A. Mus. 23324), *Zeyher* 5045 (S.A. Mus. 23325), *Zeyher* S.A. Mus. 23322; Slopes of Twelve Apostles facing Hout Bay, *Goulimis* in *Bolus* Herb. 22809; damp cliffs W. side Table Mt., *Esterhuysen* in *Bolus* Herb. 22811; Devil's Peak, *Goulimis* in *Bolus* Herb. 22819; Karbonkelberg, *Salter* 2859; Chapmans Bay, *Wolley Dod* 3692, *Salter* 7816, *Lewis* in S.A. Mus. 53940; Marsh between Smitswinkel and Cirkels Vlei, *Salter* 4968, 1901; Bergvliet, *Leighton* in *Bolus* Herb. 22688; Wynberg Flats, *Prior* s.n.; Camp Ground, *Zeyher* 4200 (S.A. Mus. 23359, 23401, 23402.) *Galpin* 3503; Signal Hill, *Marloth* 7268; Camps Bay, *Marloth* 306. Cape Flats, *Zeyher* 1679, 1680, *Pappe* in S.A. Mus. 23353, 23321; Malmesbury Div.: near Malmesbury, *Esterhuysen* in *Bolus* Herb. 22689; Bet. Malmesbury and Hopefield, *Lavis* in *Bolus* Herb. 20346; near Hopefield, *Lavis* in *Bolus* Herb. 22151; Groenekloof, *Bolus* 4350; near Mamre, *Salter* 4893b; near Malmesbury, *Ryder* in *Bolus* Herb. 19989; near Mamre, *L. Bolus* in *Bolus* Herb. 22150; near Kalabas Kraal, *Leighton* 195; near Darling, *Leighton* 137; Langebaan, *Pillans* 6712, *Lewis* in Nat. Bot. Gdns. 2028/32, *Martley* in *Bolus* Herb. 22697; Between Mamre and Darling, *Salter* 6870. Stellenbosch Div.: near Somerset Strand, *Leighton* in *Bolus* Herb. 22690; Faure, *Compton* 15259; Sir Lowry's Pass, *Pells* in *Bolus* Herb. 22695; Vergelegen, Somerset West, *Barker* in *Bolus* Herb. 22147; near Bottelary, *Leighton* in *Bolus* Herb. 22691, 22692, 22694, 22707; Jonkers Hoek, *Compton* 15263, 15261; Stellenbosch Golf Course, *Martley* in *Bolus* Herb. 22693. Clanwilliam Div.: Boekenberg, *Leighton* in *Bolus* Herb. 22146; Paleisheuvel, *Esterhuysen* in Nat. Bot. Gdns. 2371/34. Caledon Div.: Rivier Zonder Einde, *Walgate* in *Bolus* Herb. 22696; Hermanus, near the sea, *Lavis* in *Bolus* Herb. 22152; Onrust River, *Esterhuysen* 2000; Hermanus, *Rogers* 29052.

[Fig. 11. Map III.]

Forma β . Inflorescence elongated not corymbose, ovary somewhat globose.

Hab. Piquetberg Div.: East base of Piquetberg, *Pillans* 8645; Pools, *Pillans* 9846; Papkuils Vlei, *Leighton* 135, *Barker* 2646; Between Piquetberg and Grey's Pass, *L. Bolus* in *Bolus* Herb. 22814, 22815; near Piquetberg, *Leighton* 189; near Redelinghuys, *Leighton* 188; Piquetberg, *Peers* in *Bolus* Herb. 22153. Clanwilliam Div.: Citrusdal, *Compton* in Nat. Bot. Gdns. 2011/36; Between Clanwilliam and Doorn River Bridge, *Pillans* 8369; Jan Diesels River, *Leighton* in *Bolus* Herb. 22698; Algeria, *Lamb* in Nat. Bot. Gdns. 1640/30; Pakhuis, *Leighton* in Nat. Bot. Gdns. 1493/33; Clanwilliam, *G. G. Smith* 2658. Calvinia

Div.: Nieuwoudtville, *Barker* in Nat. Bot. Gdns. 1768/30. Ceres Div.: Rosendalfontein, *Pillans* 9565; Between Gydo Pass and Elands Kloof, *Leighton* in Bolus Herb. 22701. Malmesbury Div.: Riebeeck Kasteel, *Salter* 1791; Malmesbury, *Ryder* in Bolus Herb. 19982;



[Fig. 11A. Map III].

Forma γ . Inflorescence elongated, bracts long and conspicuous, perianth segments acute.

Hab. Piquetberg Div.: Verloren Vlei, *Pillans* 8116, *Leighton* 194; Kapiteins Kloof, *Pillans* 8089. Clanwilliam Div.: Alpha, Olifants River Valley, *Pillans* 9849; Olifants River Valley, *Pearson* 5337.

[Fig. 11b. Map III.]

Forma δ . Outer stamens expanded somewhat more than in the typical form, stamens less than half the length of the perianth segments. Seeds markedly denticulate on the angles.

Hab. Cape Div.: Melkbosch Strand, *Salter* 4888. Malmesbury Div.: Groenekloof, *Pappe* in S.A. Mus. 23355. Worcester Div.: Near Worcester, *L. Bolus* in Bolus Herb. 20348. Tulbagh Div.: Saron, *Lewis* in Bolus Herb. 22104; Tulbagh, *L. Bolus* in Bolus Herb. 22156; *Pappe* in S.A. Mus. 23364; Roodesand Mts., *Stokoe* in Bolus Herb. 22155; Artois, *Esterhuysen* 6078. Caledon Div.: near Caledon, *Salter* 4878; Viljoens Pass, *Salter* 4038; Between Napier and Caledon, *Barker* in Bolus Herb. 22145; Caledon, *Pillans* 9793, *Leighton* in Nat. Bot. Gdns. 1689/33, *Crocker* in Nat. Bot. Gdns. 1388/31, *Galpin* 4767, *Marloth* 8057.

[Fig. 11c. Map III.]

Forma ϵ . Perianth segments long and narrow, stamens relatively short.

Hab. Piquetberg Div.: near Berg River, *Leighton* 170; Berg River Islands, *Leighton* 196; Zoutkloof, *Leighton* 138; Pools, *Lewis* in Bolus Herb. 22847; Between Eendekuil and Moorreesburg, *L. Bolus* in Bolus Herb. 22848; Piquetberg, *Marloth* 6299. Malmesbury Div.: near Hopefield, *Leighton* 166, *Walgate* in Bolus Herb. 22821; Between Malmesbury and Hopefield, *Mathews* in Bolus Herb. 22822.

[Fig. 11d. Map III.]

Forma ζ . Pedicels short, erect never spreading. Perianth segments narrow, stamens relatively long, erect, ovary long ovoid.

Hab. Piquetberg Div.: near Sauer, *Leighton* 163; near Piquetberg *Leighton* 164; De Hoek, *Barker* 2570; Bottom of Versfeld's Pass, *Pillans* 1722. Paarl Div.: near Wellington, *Leighton* 445. Tulbagh Div.: Tulbagh, *Peers* in Bolus Herb. 22846; Twenty-four Rivers, *Lewis* in Bolus Herb. 22103. Malmesbury Div.: near Oude Post, *Salter* 3875; Oude Post Vlei, *Mathews* in Nat. Bot. Gdns. 2353/29; Between Kalabaskraal and Abbotsdale, *Lewis* in Nat. Bot. Gdns. 1866/32; Moorreesburg, *Marloth* 11486; W. side of the Piquetberg, *Marloth* 11039.

[Fig. 11e. Map III.]

Forma η . Peduncle stout, pedicels arcuate, leaves erect clasping the peduncle at the base. Style shorter than in the typical form, ovary somewhat conical.

Hab. Clanwilliam Div.: Kanolvlei, *Martin* in Nat. Bot. Gdns. 1746/37; *Barker* 296; *Lewis* in Bolus Herb. 22699. Calvinia Div.: Calvinia, *Green* in Nat. Bot. Gdns. 2800/32. Little Namaqualand: *Scully* 204; Besondermeid, *Taylor* 1202; between Garies and Khamieskroon, *Leighton* in Bolus Herb. 22700; Steinkopf, *Taylor* in Nat. Bot. Gdns.

3149/35; Klipvlei, between Garies and Khamieskroon, Thorne in S.A. Mus. 49961.

[Fig. 11 f. Map III.]

Kunth and Baker have stated that Linnaeus included both *O. arabicum* and *O. thyrsoides* in his description of *O. arabicum*, but from the literature available I can see no evidence for this. The citation from Royen's Hortus Lugdb. may possibly refer to a Cape Plant.

Jacquin states emphatically that the plant he describes as *O. thyrsoides* is quite distinct from that which Linnaeus knew as *O. arabicum*. He had seen the literature which Linnaeus quoted. The plant described and figured by Jacquin in Hort. Vind. III is undoubtedly that which grows most commonly in the South-western Cape. The typical form always has a ciliated leaf-margin, but in his description Jacquin says that the plant is glabrous and his illustration gives no indication of ciliation. Under greenhouse conditions this feature may have become much less conspicuous than it is in the wild state and may have been overlooked by the artist and by Jacquin in drawing up his description.

O. thyrsoides is a large and very variable species and, after repeated attempts to find a stable basis on which to divide the numerous forms into separate species, the author feels that this cannot be done satisfactorily without the help of cytological studies.

As can be seen on the accompanying map *O. thyrsoides* has a wide distribution ranging from Little Namaqualand through the South-Western Cape as far as Caledon. The centre of distribution appears to be the Malmesbury District.

12. *O. lacteum* Jacq. Coll. Suppl. 76; Ic. II 20, t. 434; Willd. Sp. Plant II, 117; Andr. Bot. Rep. t. 274; Red. Lil. VII t. 418; Kunth Enum. IV. 354; Bak. Journ. Linn. Soc. XIII, 283 (excl. var.); Bak. Fl. Cap. VI, 505 (excl. var.); *O. aestivum* L. Bolus S.A. Gardening XXIV, 50; *Aspasia lactea* Salisb. Gen. 34.

Plants up to 65 cm. high. *Bulbs* globose, white, 25—55 mm. diam. *Leaves* 4—6, leathery, oblong-lanceolate, usually completely dead at flowering time, 7—10 cm. long, 2—3 cm. broad, margins hyaline, densely fimbriate, apices obtuse or sub-acute. *Inflorescence* many-flowered, compact, bracts ovate with acute or acuminate apices, pedicels ascending 1—2 cm. long. *Perianth* white, segments long-ovate, obtuse, 15—20 mm. long, 7—10 mm. broad. *Stamens* about half as long as the perianth segments, filaments slender, three inner a little broader at the base than the outer. *Ovary* yellowish, ovoid, style slender, stigma papillose. *Seeds* black, verrucose, amongst the largest in the genus. Flowering Nov.—Jan.

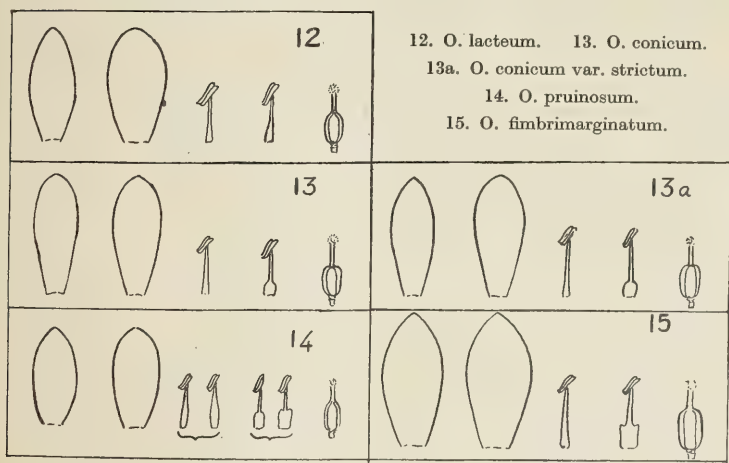
Hab. Cape Province. Cape Peninsula: Lions Head, Goulimis in

Bolus Herb. 22775, *Leighton* 175; Camps Bay, *MacOwan* 2652 (S.A. Mus. 23358), *Zeyher* 5047; Karbonkelberg, *Salter* 2860. Cape Div.: near Melkbosch, *Wasserfall* 779. Stellenbosch Div.: Gordons Bay, *Martley* in Bolus Herb. 22776, 22777. Clanwilliam Div.: *Foote* in Nat. Bot. Gdns. 1479/25. Malmesbury Div.: near Hopefield, *Pillans* 8370; between Malmesbury and Mamre, *L. Bolus* in Bolus Herb. 20974; Hopefield, *Letty* in Nat. Herb. 22826.

Most of the figures cited are of very luxuriant plants and the leaves are usually longer than any specimens found in the wild state.

[Fig. 12. Map. III.]

13. *O. conicum* Jacq. Coll. III, 232; Ic. II, 428; Willd. II, 118;



Kunth Enum. IV, 354; *O. lacteum* Jacq. Bot. Mag. 1134; *O. lacteum* Jacq. var. *conicum* Bak. Journ. Linn. Soc. XIII, 284 (excl. Hook Bot. Mag. 3538.).

Plants up to 60 cm. high. *Bulb* ovoid up to 2 cm. diam. *Leaves* 3—6, ascending, frequently encircling the peduncle at the base, 10—20 cm. long, 10—25 mm. wide, margins ciliate. *Inflorescence* many-flowered, conical in the early stages, tending to elongate, bracts usually exceeding the pedicels, pedicels 5—20 mm. long. *Perianth* white, segments spreading widely, long-ovate, 15—20 mm. long, 6—8 mm. broad, apices obtuse or sub-acute. *Stamens* half as long as the perianth segments, filaments subulate three inner expanded at the base. *Ovary* ovoid, apex truncate, yellow, style slender, yellow, stigma capitate, papillose, style and stigma together as long as the ovary.

Hab. Cape Province. Calvinia Div.: Grasberg, *Ryders* in Nat. Bot. Gdns. 2272/30. Clanwilliam Div.: Pakhuis Pass, *Lewis* in Bolus Herb. 22799; Welbedacht, *Barker* 295.

[Fig. 13. Map IV.].

Var. *strictum* (L. Bolus) Leighton var. nov.

O. strictum L. Bolus Journ. Bot. LXXI, 72. This var. differs from the typical specimens in having a long narrow inflorescence, longer stamens and shorter pedicels.

Hab. Cape Province. Van Rhynsdorp Div.: Van Rhyns Pass, *Ross Frames* in Bolus Herb. 20072. Clanwilliam Div.: Nieuwoudt Pass, *Lamb* in Nat. Bot. Gdns. 1644/30; near Clanwilliam, *Salter* 2755; 2 miles S. of Clanwilliam, *Salter* 2805; *Marloth* 9455 (without particulars).

[Fig. 13A. Map IV.].

14. *O. pruinoseum* Leighton sp. nov.

Plantae alt. ad 50 cm. *Bulbus* ovoideus, tunicis brunneis vel atris, duris. *Folia* 4—6, laete viridia, glauca, erecta, lanceolata vel oblongo-ovata, acuta vel sub-obtusa. *Inflorescentia* multiflora; bractee longo-acuminatae. *Perianthium* niveum, segmentis obtusis vel sub-acutis. *Filamenta*, tria exteriora simplicia, tria interiora basibus expansis. *Ovarium* ovoideum, viridi-flavum, stylo et stigmatibus flavis. *Semina* pustulata, angulis saepe papillosis.

Hab. Cape Province. Little Namaqualand: Between Garies and Khamieskroon, *L. Bolus* in Bolus Herb. 22781 (*Type*); Khamiesberg, *Thorns* in Herb. Nat. Bot. Gdns. s.n.; Klipfontein, *Mathews* in Nat. Bot. Gdns. 1889/31, *Pillans* 4935; Brakfontein, *Pillans* 5448, *Scully* 155. *Pearson* 7743; Arakup, *Schlechter* 11249; O'okiep, *Morris* in Bolus Herb. 5805; Richtersveld, *Marloth* 12350; Doorn River, *Herre* in Stell. Univ. Gdns. 3971; Kubus, *Herre* in Stell. Univ. Gdns. 3837; Kommaggas Kloof, *H. Bolus* 6597; Steinkopf, *Marloth* 6826; Khamieskroon, *Thorne* in S.A. Mus. 48847; Springbok, *Henrici* 2177. Van Rhynsdorp Div.: Van Rhynsdorp, *Kolbe* in Bolus Herb. 14312; Between Nieuwerust and Van Rhynsdorp, *Leipoldt* 4028; Klaver, *Ross Frames* in Nat. Bot. Gdns. 1259/26; Van Rhyns Pass, *Lewis* in S.A. Mus. 53354. Clanwilliam Div.: Diamond Drift, *Leipoldt* 3111. Kenhardt Div.: near Kenhardt, *Leipoldt*, Aghrabies Falls, *Leipoldt* in Nat. Bot. Gdns. 1048/36. Calvinia Div.: Loeriesfontein, *Marloth* 12855; Calvinia, *Marloth* 10244. Laingsburg Div.: Dwars-in-de-Weg, *Marloth* 9841.

Plants up to 50 cm. high usually 25—40 cm. *Bulb* ovoid, 2—3 cm. diam., encased in hard blackish tunics. *Leaves* 4—6, pale glaucous green, erect or ascending, lanceolate or ovate-lanceolate up to 17 cm. long, 3 cm. broad, apices acute or sub-acute, margins hyaline, sometimes crisped, usually minutely ciliated but often entire. *Inflorescence* dense,

many-flowered, often somewhat lax in garden grown specimens, bracts long-acuminate, greenish, pedicels 3—4 cm. long, spreading. *Perianth* white, segments spreading widely often with a faint green median stripe on the under surfaces when young, 12—25 mm. long, 7—10 mm. broad, apices acute or obtuse. *Stamens* usually erect, outer stamens simple, inner stamens somewhat expanded at the base. The stamens are very variable even in the same flower; in some the expansion of the bases is spatulate, in others there are wing-like outgrowths produced upwards. *Ovary* ovoid, greenish yellow, style slender, yellow, stigma yellow. *Seeds* pustulate, angles often markedly papillose.

Flowering Aug.—Oct.

[Fig. 14.]. Two forms of the outer and two forms of the inner stamen are given to show the amount of variation.

[Map IV.].

This species differs from *O. lacteum* and *O. conicum* in the form and texture of the leaves and in the character of the stamens.

15. *O. fimbri-marginatum* Leighton sp. nov.

Plantae alt. 20—50 cm. *Bulbus* globosus, tunicis externis duris, atris. *Folia* 4—5, ovata vel ovato-lanceolata apicibus obtusis, marginibus conspicuis, dense ciliatis. *Inflorescentia* pauci-vel multiflora. *Perianthium* niveum, segmentis acutis vel sub-acutis. *Stamina*, tria exteriora sulcata, tria interiora basibus expansis. *Ovarium* ovoideum stigmate conspicuo capitato. *Semina* papillosa, papillis obtusis, rare echinata.

Hab. Laingsburg Div.: Whitehill Ridge, south slope, *Leighton* 273 (*Type*, in Bolus Herb. and Herb. Nat. Bot. Gdns.), *Compton* 5903. *Ceres* Div.: Laken Vlei, *Phillips* 2084 (S.A. Mus. 11884). *Worcester* Div.: Matroosberg, *Stokoe* 7605; Slanghoek Pile, *Esterhuysen* 1771; Waaihoek, *Pells* in Bolus Herb. 22818; Mostert Hoek Twins, *Esterhuysen* 9317; Omklaarberg, *Stokoe* 1138; Elskloof, above Hex River, *Davidson* 32; De Doorns, *Davidson* 31 (S.A. Mus. 141). *Paarl* Div.: April Peak, *Esterhuysen* 4122; Mts. S. of Wemmershoek, *Andreae* 764; *Witzenberg*, *Andreae* 177.

Plants 20—50 cm. high. *Bulb* globose, 15—25 mm. diam. with tough, black, outer tunics. *Leaves* 4—5, ovate or ovate-lanceolate, arranged in a rosette, dying at the flowering period, 5—10 cm. long, 10—35 mm. broad. *Inflorescence* few- to many-flowered, corymbose; bracts membranous, ovate-cuspidate, shorter than the pedicels. *Perianth* white, segments acute or sub-acute, spreading widely, up to 22 mm. long, 10 mm. broad. *Stamens* about half the length of the perianth, three outer filaments simple but rather thick and grooved down the inner face, three inner with winglike expansions in the lower half. *Ovary* ovoid, green at the base, bright yellow at the apex which tapers into the

style, stigma conspicuous, capitate, papillose. *Seeds* with short blunt papillae, rarely echinate. Flowering Nov.

[Fig. 15. Map IV].

This species differs from *O. lacteum* in having the inner filaments expanded and in the character of the testa. It is very close to *O. conicum* but differs from that species in having a laxer corymbose inflorescence



MAP IV.

and leaves of a tougher texture which do not enfold the base of the peduncle.

O. flinbrimarginatum is a species with considerable variation in the stamens, in the length of the style and in the nature of the testa, but the differences are too indefinite to warrant making varieties.

16. *O. multifolium* Bak. Journ. Linn. Soc. XIII, 271.

Plants 15—25 cm. high. *Bulb* depresso-globose, 15—20 mm. diam. *Leaves* many, sub-terete, glaucous, erect or sub-erect 6—12 cm. long,

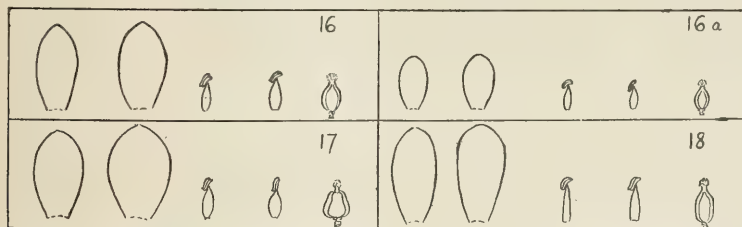
3—6 mm. diam. at the vaginate base, tapering to a filiform tip. *Inflorescence* usually dense, sub-corymbose sometimes few-flowered. *Perianth* yellow, spreading widely, segments ovate-lanceolate, acute or sub-acute, 10—12 mm. long, 4—6 mm. broad. *Stamens* short, filaments expanded sub-equal. *Ovary* ovoid, style short, stigma lobes decurrent. Flowering Sept.—Oct.

Hab. Cape Province. Little Namaqualand : *Scully* 173 ; between Garies and Khamieskroon, *Leipoldt* 3357 ; near Bethal, *Stokoe* in Herb. Marloth (s.n.) ; *Zeyher* 4204 ; trans Olifants River, *Zeyher* in S.A. Mus. 23314 (under *Pappe*.)

[Fig. 16. Map IV.]

Forma β . differs chiefly in that it is smaller in every respect.

Hab. Clanwilliam Div. : Pakhuis, *Esterhuysen* 4384 ; between Oorlogskloof and Papkuilsfontein, *Leipoldt* 4090. Calvinia Div. : Nieuwoudt-



16. *O. multifolium*.

16a. *O. multifolium* forma β .
18. *O. rupestre*.

17. *O. ranunculoides*.

ville, *Compton* in Nat. Bot. Gdns. 1528/26. Ceres Div. : Bokkeveld, *Marloth* 7524. Little Namaqualand : *Scully* Herb. Norm. 1391 ; near Garies, *Esterhuysen* 1290.

[Fig. 16a. Map IV.]

The author has been unable to see the *Whitehead* plant cited by Baker as his type, but from the description *Scully* 173 would seem to be the same species. This specimen has no colour note of the flower and has faded to appear white. No white-flowered specimen has hitherto been found of the species in this group and it is doubtful whether Baker's statement is correct.

17. *O. ranunculoides* L. Bolus S.A. Gardening XXIII, p. 61 (1933).

Plants 12—23 cm. high. *Bulb* ovoid or globose, white, up to 2 cm. diam. *Leaves* 3—5, sub-terete, glaucous, 5—10 cm. long, 1—5 mm. diam., sometimes more at the base which is vaginate for 1—2 cm. *Inflorescence* few-flowered, sub-corymbose, bracts short, broad. *Perianth* golden yellow, cup-like, segments broad, obtuse, concave, never spreading

widely, up to 13 mm. long and 8 mm. broad. *Stamens* short, all filaments broadly expanded, three inner wider than three outer, 4—5 mm. high, 2—3 mm. broad. *Ovary* sub-globose, style short, stigma lobes decurrent. Flowering Sept.—Oct.

Hab. Cape Province. Little Namaqualand: Steinkopf, *Marloth* 6297, *Herre* in *Stell. Univ. Gdns.* 3972, 3978; Klipfontein, *Mathews* in *Nat. Bot. Gdns.* 1888/31; Goechas, *Schlechter* 11368; *Morris*, *Herb. Bolus* 5806; between Steinkopf and Orange River, *Phillips* 1634 (*S.A. Mus.* 9011).

[Fig. 17. Map IV.]

18. *O. rupestre* L.f. *Suppl.* 199; *Thunb. Prod.* 61; *Thunb. Fl. Cap. edit. Schultes* 313 (in part); *O. aurantiacum* *Bak. Gard. Chron.* X, 748, 1878.

Plants 4—15 cm. high. *Bulb* white, sometimes with brownish outer tunics, globose or ovoid, 10—15 mm. diam. *Leaves* 3—6, slender sub-terete, glaucous, vaginate at the base, 3—6 cm. long, 1—2 mm. diam. *Inflorescence* 1—5-flowered, bracts papery, broad, enfolding the pedicels, usually as long as or longer than the pedicels. *Pedicels* 5—15 mm. long, erect or ascending. *Perianth* yellow or orange, segments spreading, acute or sub-acute, 10—15 mm. long, 4—6 mm. wide. *Stamens* less than half as long as the perianth segments, filaments all expanded gradually from apex to base, three inner broader than the three outer. *Ovary* ovoid, style very short, stigma lobes decurrent, papillose. Flowering Aug.—Oct.

Hab. Cape Province. Malmesbury Div.: Groenekloof, *Pappe* in *S.A. Mus.* 23315 (cited by Baker in *Flor. Cap.*); Kapoeborg, *Bolus* 12892; Groot Post, *Salter* 6226. Piquetberg Div.: Boesmans Kloof River, *Leighton* 161; Mouton Valley, *Marloth* 11496. Clanwilliam Div.: Pakhuis Pass, *Lewis* in *Bolus Herb.* 22858; Graafwater, *Salter* 2746. Worcester Div.: De Doorns, *Bolus* 13065. Laingsburg Div.: Matjiesfontein Karoo, *Compton* 3585; Whitehill, *Barker* in *Bolus Herb.* 22857, *Compton* 14848. Joseph's Kraal, *Wilmot* 1 in *Nat. Herb.*; Hillandale, *Marloth* 11434. Montagu Div.: Along road to Touws River, *Lewis* in *Bolus Herb.* 22856.

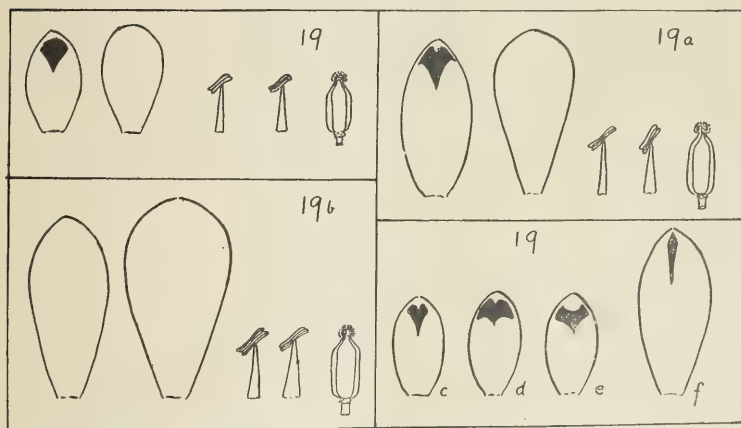
[Fig. 18. Map IV.]

The author has rejected that part of Thunberg's description in his *Flora Capensis* p. 313 which refers to a white-flowered form from Witteklip since this has not been found to occur anywhere else, and is probably a different species. When it is possible to visit Witteklip near Saldanha Bay this problem may be solved. The yellow form from Groenekloof is without doubt the plant which Baker described as *O. aurantiacum*.

19. *O. maculatum* *Jacq. Coll.* II, 368, t. 18, f. 3; *Thunb. Prodr.* 62;

Thunb. Fl. Cap. edit Schultes 314 ; Kunth Enum IV 352 ; *O. thunbergianum* Bak. Journ. Linn. Soc. XIII, 269 ; Bak. Fl. Cap. VI 497 ; *Phaeocles maculata* Salisb. Gen. Pl. 35.

Plants 10—50 cm. high. *Bulb* ovoid, globose or depresso-globose, 1—3 cm. diam. *Leaves* 2—5, erect or ascending, glaucous, semi-fleshy, broad at the base and often sheathing the peduncle, 5—15 cm. long, 5—30 mm. broad, apex acute or sub-acute. *Inflorescence* 1—8-flowered, bracts dry, papery, acuminate from a broad base, usually longer than the pedicels ; pedicels often arcuate ; pedicels 1—3 cm. long, not lengthening appreciably as the flower ages. *Perianth* golden, yellow, orange or orange-red, three outer segments usually tipped or spotted with black



19, 19c, d, e. *O. maculatum*. 19a, 19f. *O. maculatum* var. *speciosum*. 19b. *O. maculatum* var. *splendens*.

near the apex, obtuse or sub-acute, 15—30 mm. long, 8—12 mm. broad ; three inner segments obovate, obtuse 15—30 mm. long, 8—16 mm. broad. *Stamens* about half the length of the perianth segments, filaments simple, yellow or orange, white at apex and base, three inner somewhat broader than the outer. *Ovary* oblong, obtusely angled, pale yellow-green, 5—9 mm. long, 3—4 mm. diam. *Style* absent or almost so. *Stigma* large, with decurrent papillose lobes. *Seeds* small, minutely verrucose. Flowering Sept.—Oct.

Hab. Malmesbury Div. : near Malmesbury, *Bolus* 4346. Piquetberg Div. : Kapiteins Kloof, *Pillans* 8088 ; Groenvlei, *Guthrie* 2712 ; Sauer, *Barker* 2662 ; Grey's Pass, *Lewis* in *Bolus* Herb. 20699. Tulbagh Div. : Tulbagh Kloof, *Esterhuysen* 6061 ; Tulbagh, *Peers* in *Bolus* Herb. 22828, *Grant* 2425, *Guthrie* 2391 ; New Kloof, *Compton* 11700. Clan-

william Div.: Clanwilliam, *Stell. Univ. Gdns.* 869; near Sandberg, *Leighton* in Bolus Herb. 21621; near base of Sneeuwkop, *Leighton* in Bolus Herb. 21620; Clanwilliam, *Peers* in Bolus Herb. 17543; Nieuwoudt Pass, *Esterhuysen* 8159; Kromme River, *Leighton* in Bolus Herb. 21622; Algeria, *Barnes* in Bolus Herb. 19281; Elands Kloof, *Lewis* in Bolus Herb. 22087, *Compton* 9692, *Esterhuysen* 4360; Pakhuis, *Barker* 294, *Compton* 9571, *Wagener* 208, *Leipoldt* in S.A. Mus. 23309; Olifants River, *Zeyher* in S.A. Mus. 23308 (under *Pappe*); *Zeyher*, Saldanha Bay in S.A. Mus. s.n. (under *Pappe*). Calvinia Div.: Top of Van Rhyn's Pass, *Esterhuysen* 5662, *Barker* 1925; Graskop to Nieuwoudtville, *L. Bolus* in Bolus Herb. 19832. Ceres Div.: Karoo Poort, *Barker* 1921. Laingsburg Div.: Tweedside, *Compton* 3127, *Lewis* in Bolus Herb. 22829; Witteberg, *Compton* 3565; Whitehill Ridge, *Compton* 14846.

[Fig. 19 and Fig. 19c., d., e (showing variation in spotting). Map IV.]

Var. **speciosum** (Bak.) Leighton var. nov.

O. speciosum Baker in Journ. Bot. Vol. XX, p. 72. *O. thunbergianum* Bak. S.A. Fl. Plants, pl. 65. *O. insigne* Leighton nom. nov. Journ. S.A. Bot. IX, 113.

This form differs from the typical chiefly in size; it is larger in every respect and occurs in the North-western districts.

Hab. Cape Province. Little Namaqualand: *Scully* 175, *Scully* in Herb. Norm. 1390, *Zeyher* 4203 (S.A. Mus. 23310); *Ecklon and Zeyher* Brakfontein in S.A. Mus. 23311; North of Khamieskroon, *Leighton* 447; Khamieskroon, *Thorne* in S.A. Mus. 48851. Calvinia Div.: Calvinia, *MacPherson* in Nat. Bot. Gdns. 3474/14, *Stewart* in Bolus Herb. 22823; Van Rhyn's Pass, *Salter* 1616; *Phillips* Sladen Mem. Exped. 7653. Van Rhynsdorp Div.: *Herre* in Stell. Univ. Gdns. 968. Clanwilliam Div.: Kanolvlei, *Lewis* in Bolus Herb. 22824; Olifants River, *Pappe* in S.A. Mus. 23308 (plant probably collected by *Zeyher*).

[Fig. 19a and f. Map IV.]

Var. **splendens** (L. Bolus) Leighton var. nov.

O. splendens L. Bolus S.A. Gardening. Vol. XXI, 13 (1931). *O. aureum* Andr. Bot. Rep. 505.

Differs from the typical in having larger, immaculate flowers and broader filaments.

Calvinia Div.: near Nieuwoudtville, *Buhr* in Nat. Bot. Gdns. 2654/30, *Nieuwoudt* in Nat. Bot. Gdns. 2134/34, *Starke* in Bolus Herb. 17831, *Naish* in Nat. Bot. Gdns. 1667/30; near Calvinia, *Stewart* in Bolus Herb. 22827, *Marloth* 6657. Van Rhynsdorp Div.: Van Rhynsdorp, *A. A. Schmidt* 246 in Nat. Herb. Clanwilliam Div.: Clanwilliam, *Leipoldt* 237 (S.A. Mus. 23333).

[Fig. 19b. Map IV.]